11/23/99 JC639 U.S. PTO

PATENT
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JC511 U.S. PTO 09/447419 11/23/99

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Assistant Commissioner for Patents
BOX PATENT APPLICATION
Washington, D.C. 20231

TRANSMITTAL FOR A NEWLY EXECUTED ORIGINAL APPLICATION UNDER 37 C.F.R. §1.53(b)

This is a request for filing a patent application under 37 C.F.R. §1.53(b) for:

Inventor(s): Haruo TANAKA

For: ORGANIC EL DEVICE AND METHOD OF MANUFACTURING THE SAME

1. This is a new [X] **Utility** [ ] **Design** [ ] **Plant** patent application.

2. The papers enclosed to obtain a filing date are as follows:
   16 Pages of Specification including
   0 Title Page
   4 Pages of Claims
   1 Page(s) of Abstract
   3 Sheets of drawings containing 3 Figures

   [ ] The enclosed drawing(s) are photograph(s), and there is also attached a PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)

3. Combined Declaration and Power of Attorney
   [X] Enclosed and is executed by all inventors.
   [ ] Not Enclosed.
   This application is being filed under the provisions of 37 C.F.R. §1.53(f). Applicant(s) await notification from the Patent and Trademark Office of the time set for filing the Declaration and paying the filing fees.

4. Language

[X] English

[ ] Non-English

This application is being filed in accordance with 37 C.F.R. §1.52(d) and §608.01 of the MPEP. Applicant(s) await notification from the Patent and Trademark Office of the time set for filing the verified English translation and the processing fee.

5. Assignment

[X] An assignment of the invention to Rohm Co., Ltd. and a PTO Form-1595, Recordation Form Cover Sheet, are enclosed.

[ ] An assignment will be filed at a later date.

6. Priority - foreign applications under 35 U.S.C. §119(a)-(d) or §365(b) or PCT international applications under 35 U.S.C. §365(a) designating at least one country other than the U.S.

[X] Priority of the following foreign application(s) is claimed:

Country	Application No.	Filed
Japan	Hei. 10-337976	November 27, 1998

Certified copy(ies): [X] is/are attached. [ ] will follow.

7. Priority based on provisional application(s) - 35 U.S.C. §119(e)

[ ] Priority of the following provisional application(s) is claimed:

Application No.	Filed

A. Relate Back - 35 U.S.C. §119(e)

[ ] Amend the specification by inserting before the first line the sentence: "This application claims priority of copending provisional application(s) No. _____ filed on _____."

8. Small entity status

[ ] A statement claiming small entity status under 37 C.F.R. §§1.9 and 1.27 is enclosed.

9. Fee Calculation (37 C.F.R. §1.16)

CLAIMS FOR FEE CALCULATION				
	Number Filed	Number Extra	at Rate of	Basic Fee Utility $760.00 Design $310.00
Total Claims (37 C.F.R. §1.16(c))	11 - 20 =	0	$ 18.00 each=	$0.00
Independent Claims (37 C.F.R. §1.16(b))	2 - 3 =	0	$ 78.00 each=	$0.00
Multiple dependent claim(s), if any (37 C.F.R. §1.16(d))			$260.00	+
			SUB-TOTAL =	**$760.00**
			Reduction by 1/2 for filing by a small entity	**- $**
			TOTAL FILING FEE =	**$760.00**

10. Fee Payment

[ ] Not Enclosed. **NO FEE IS BEING PAID BY CHECK OR DEPOSIT ACCOUNT AT THIS TIME.**
This application is being filed under the provisions of 37 C.F.R. §1.53(f). Applicant(s) await notification from the Patent and Trademark Office of the time set for filing the Declaration and paying the filing fees.

[X] Enclosed.
Two check(s) in the amounts of $ 760.00 and $40.00 representing the filing fee of $760.00 and an assignment recording fee of $40.00 is enclosed.

11. [X] **Except** for issue fees payable under 37 C.F.R. §1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. §1.136(a)(3).

12. Additional papers enclosed:

[ ] Preliminary Amendment
[ ] Information Disclosure Statement
[ ] Form PTO-1449, _____ listed thereon
[ ] Declaration of Biological Deposit
[ ] Submission of "Sequence Listing", computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

Please accord this application an application number and filing date.

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP

J. Michael Thesz
Reg. No. 40,354

Dated: November 23, 1999

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ORGANIC EL DEVICE AND METHOD OF MANUFACTURING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an organic EL device, and more particularly to an organic EL device provided with a sealing member for sealing a lower electrode, an organic EL layer and an upper electrode.

2. Description of the Related Art

Fig. 2 is a perspective view of an conventional EL display panel 25 provided with an organic EL device. In the EL display panel 25, a plurality of strip-shaped transparent electrodes 11 of ITO (Indium Tin Oxide) (hereinafter referred to as an ITO transparent electrode(s)) are arranged on a glass substrate 2 in a direction of arrow 93. Above the ITO transparent electrodes, a plurality of strip-shaped organic layers 12 are arranged in a direction of arrow 94. A plurality of strip-shaped upper electrodes 13 are superposed on the organic layers 12, respectively.

Fig. 3 is a sectional view of the conventional EL display panel 25, taken in line I - I in Fig. 2. As seen from Fig. 3, the ITO transparent electrodes 11 as a lower electrode, organic EL layers 12 and upper electrodes 13 are covered with and sealed by a cap 15 on the glass substrate 2. The cap 15, which is made

of metal or glass, is secured to the glass substrate 2 by adhesive. The internal space 17 of the cap 15 is filled with nitrogen.

Generally, deposition of impurities such as moisture on an organic EL device greatly changes a device characteristic. This largely attenuates reliability of the organic EL device. In order to overcome such an inconvenience, an adsorbent 16 of barium oxide is provided within the cap 15 to adsorb the impurities such as moisture.

In the EL display panel 25, when a voltage is applied between a prescribed ITO transparent electrode 11 and a prescribed upper electrode 13, an organic EL layer 12 located at an area where these electrodes are overlapped, emits light. Therefore, by controlling selection of each ITO transparent electrode 11 and each upper electrode 13, a desired display can be realized using the EL display panel 25.

The above conventional organic has the following defects. Sealing by the cap 15 requires for the cap 15 to be formed in a prescribed shape. This leads to poor efficiency and high cost in manufacturing.

Particularly, when the cap 15 of metal is used, the upper electrode 14 and cap 15 must be kept into non-contact with each other. Therefore, in order to secure the cap 15 on the glass substrate 2, it must be adjusted in position and thereafter bonded to the glass substrate 2. This leads to poor efficiency and high cost in manufacturing. Further, in order to assure the non-

contact between the upper electrode 13 and the cap 15, an insulator such as an insulating material or space (e.g. space L1 shown in Fig. 3) must be located therebetween. This impedes the thin-profiling of the organic EL device.

Further, provision of the adsorbent 16 within the cap 15 further impedes thin-profiling of the organic EL device. In addition, the provision of the adsorbent 16 results in poor workability and high cost in manufacturing.

SUMMARY OF THE INVENTION

A first object of the present invention is to provide an organic EL device which can provide high efficiency of manufacturing, reduce production cost, obtain great reliability and realize thin-profiling.

A second object of the present invention is to provide a method of manufacturing such an organic EL device.

In order to attain the above first object, in accordance with the present invention, there is provided an organic EL device comprising: a lower electrode formed on a substrate; an organic EL layer formed on the lower electrode; an upper electrode formed on the organic EL layer; a sealing member for sealing the upper electrode, organic EL layer and upper electrode on the substrate so that they are covered with the sealing member, wherein the sealing member is made of an aluminum material coated with an insulating layer in its inner surface.

In this configuration, since the sealing member is made of an aluminum material coated with an insulating layer in its inner surface, contact of the aluminum material with the upper electrode produces no trouble. Thus, such a fine alignment as required in sealing by a metallic cap is not required, thereby improving working efficiency and reducing the production cost. Further, any insulator for assuring non-contact between the aluminum material and the upper electrode is not required so that the organic EL device can be formed in a thin-profile style. In addition, the aluminum foil is so flexible that it can be deformed freely, thereby improving working efficiency and reducing the production cost.

Preferably, the aluminum material is a flexible aluminum sheet. Therefore, it is not necessary to form the aluminum material in a prescribed shape in advance, thereby improving working efficiency and reducing the production cost.

Preferably, the insulating layer is an aluminum oxide layer formed by anodic oxidation of the aluminum material. Since the surface of such an oxide layer is porous, impurities can be taken into a large number of pores of the anodic oxide layer, thereby improving the reliability of the organic EL device. This oxide layer has both functions of insulation and absorbing the impurity such as moisture. For this reason, it is not necessary to provide an insulator and an impurity absorbing member individually, thereby providing a thin-profile EL device and

improving working efficiency and reducing the production cost.

Preferably, the insulating layer is a porous aluminum oxide layer. Since such a porous oxide layer can have a function of "gettering" of taking impurities into a large number of pores, it can take the impurities internally generated during use, thus lengthening the life of the organic EL device.

Preferably, the aluminum sheet is formed in such a manner that a surface of the aluminum oxide layer is subjected to gas flow-out treatment in vacuum, and thereafter the lower electrode, organic EL layer and upper electrode are sealed on the substrate in an atmosphere of inert gas.

In this configuration, the surface of the aluminum oxide layer is subjected to gas flow-out treatment, and the lower electrode, organic EL layer and upper electrode are sealed on the substrate by the sealing member. Therefore, gas can be caused to flow out from the large number of pores of the aluminum oxide layer so that the impurity can be taken into the pores, thereby improving the reliability of the organic EL device. In order to attain the second object, in accordance with the present invention, there is provided a method of manufacturing an organic EL device comprising the steps of: forming a lower electrode formed on a substrate; forming an organic EL layer on the lower electrode; forming an upper electrode on the organic EL layer to provide the organic EL device; preparing an aluminum material coated with an insulating layer in at least its inner surface;

and sealing the organic EL device so that it is covered with the aluminum material.

In the manufacturing method, preferably, the step of preparing the aluminum material comprises the steps of: making anodic oxidation to form an aluminum oxide layer on a surface of a flexible aluminum sheet; and removing gas contained within the aluminum oxide layer, and the step of sealing the organic EL device comprises the step of: fixing the aluminum sheet with the gas removed on a surface of the substrate in an atmosphere of inert gas or in vacuum.

In the manufacturing method, preferably, the step of removing gas is to heat the aluminum sheet with the aluminum oxide layer for several -60 minutes at 60-300 °C in vacuum.

In the manufacturing method, preferably, the step of making anodic oxidation is to form a porous aluminum oxide layer; and the step of removing gas is to heat the aluminum sheet in vacuum so that impurities contained in pores of the porous aluminum oxide layer are discharged.

In the manufacturing method, the step of sealing the organic EL device comprises the steps of: mounting the organic EL device and aluminum sheet in a sealing chamber and once heating them at room temperature - 150 °C in vacuum; introducing inert gas into the sealing chamber; and fixingthe aluminum sheet on the substrate through an adhesive and heating it.

In the manufacturing method, preferably, the inert gas

is argon gas.

The above and other objects and features of the present invention will be more apparent from the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side sectional view of an EL display panel which is an embodiment of an organic EL device according to the present invention and also a sectional view taken in line I - I in Fig. 2;

Fig. 2 is a perspective view of an EL display panel 25 using an organic EL device; and

Fig. 3 is a side sectional view of a conventional EL display panel 25 and also a sectional view taken in line I - I.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An explanation will be given of an embodiment of an organic EL device according to the present invention taking an EL display panel of an EL display as an example. Fig. 1 is a side sectional view of an EL display panel 25 according to the embodiment and also a sectional view taken in line I - I in Fig. 2. Fig. 2 is a perspective view of the EL display panel 25.

As seen from Fig. 2, in the EL display panel 25, a plurality of strip-shaped transparent electrodes 11 made of ITO (Indium Tin Oxide) are arranged on a glass substrate 2 in a direction of arrow

93. Above the ITO transparent electrodes, a plurality of strip-shaped organic layers 12 are arranged in a direction of arrow 94 which is on the plane to which the direction of arrow 93 belongs to and which is orthogonal to the arrow 93. A plurality of strip-shaped upper electrodes 13 are superposed on the organic layers 12, respectively.

Figs. 1 and 2 schematically show the transparent lower electrodes 11, which are arranged on a glass substrate 2, organic layers 12 which are organic EL layers, and upper electrodes 13. Actually, a large number of minute ITO transparent electrodes as the transparent lower electrodes 11, organic layers 12 and upper electrodes 13 are arranged on the glass substrate 2.

In the EL display panel 25, when a voltage is applied between a prescribed transparent lower electrode 11 and a prescribed upper electrode 13, an organic EL layer 12 located at an area where these electrodes are overlapped emits light. Therefore, by controlling selection of each ITO transparent electrode 11 and each upper electrode 13, a desired display can be realized using the EL display panel 25.

The ITO transparent electrodes 11, organic layers 12 and upper electrodes 13 are sealed with an aluminum foil 3 serving as a sealing member or aluminum sheet, and an internal space 5 is filled with argon gas. On the internal face of the aluminum foil 3, an anodized-aluminum (Alumilite) layer 4 is formed serving as an insulating layer or anodic oxide layer.

In this embodiment, an aluminum foil 3 having a thickness of about 10 μm is used. Another aluminum foil that is thicker or thinner than it may be used. The respective terminals of the ITO transparent electrodes 11 and upper electrodes 13 are taken out from the aluminum foil 3. On the other hand, the organic layers 12 are completely housed within the aluminum foil 3 so that impurities such as moisture are not applied to the organic layers 12.

The aluminum foil 3 in this embodiment will be made by the following process, and is secured to the glass substrate 2 so as to cover the ITO transparent electrodes 11, organic layers 12 and upper electrodes 13. First, the aluminum foil 3 is immersed in an electrolyte solution of e.g. nitric acid. By anodic oxidation, the Alumilite(Alumina) layer 4 is formed on the surface of the aluminum foil 3. The surface of the Alumilite layer 4 is so porous as to have a large number of minute pores.

The aluminum foil 3 provided with the Alumilitelayer 4 is located in vacuum and heated at high temperatures (60- 300 °C) for about several to 60 minutes to increase kinetic momentum. Thus, the gas contained in the pores in the surface of the Alumilite layer 4 is removed (gas flow-out processing). Thereafter, the aluminum foil 3 provided with the Alumilite layer 4 is shifted from vacuum to argon atmosphere so that it is not exposed to air. The glass substrate 2 on which the lower electrodes 11 of ITO transparent electrodes, organic layers 12

and upper electrodes 13 are formed is covered with the aluminum foil 3.

The Alumilite layer 4 formed on the surface of the aluminum foil 3 performs a function of insulation. For this reason, contact of the aluminum foil 3 with the upper electrode 13 produces no trouble. Thus, any fine alignment is not required when the aluminum foil 3 put on the glass substrate 2, thereby improving working efficiency and reducing the production cost.

Further, any insulator is not required between the aluminum foil 3 and the upper electrode 13 so that the organic EL device can be formed in a thin-profile style. In addition, the aluminum foil is so flexible that it can be deformed freely, thereby improving working efficiency and reducing the production cost.

The aluminum foil 3 put on the glass substrate 2 is bonded and secured to the glass substrate 2 by means of sealing resin 6. Putting the aluminum foil 3 on the glass substrate 2 is carried out in an atmosphere of argon. Therefore, the inner space 5 is filled with the Ar gas. Further, since the Alumilite layer 4 is porous, moisture which may be taken into the inner space 5 is taken in the pores and held there.

Thus, the Alumilite layer 34 has both functions of insulation and absorbing the impurity such as moisture, thereby providing a thin-profile and reliable EL device.

In another embodiment of the organic EL device according

to the present invention, a character, picture, etc. can be partially labelled on the surface of the Alumilite layer 4 of the EL display panel as shown in Fig. 1. The character, picture, etc. can be labelled by e.g. printing. In this case, the upper electrode 13 also adopts a transparent ITO electrode. Thus, the character, picture, etc. can be checked visually from the outside of the EL display panel 25 through the glass substrate 2, ITO transparent electrode 11, organic layer 12 and upper electrode 13.

The organic EL device according to the present invention should not be limited to the embodiments described above. For example, in the embodiment described above, the aluminum foil 3 was secured to the glass substrate 3 in the argon atmosphere so that it is put on the ITO transparent electrode 11, organic layer 12 and upper electrode 13, and the internal space 5 is filled with argon. However, the aluminum foil 3 may be secured to the glass substrate 2 in an atmosphere of nitrogen, and the internal space 5 may be filled with nitrogen.

Although the embodiment of the present invention was explained in connection with a monochromatic EL display panel, the present invention can be applied to a color EL display panel.

What is claimed is:

1. An organic EL device comprising:

a lower electrode formed on a substrate;

an organic EL layer formed on the lower electrode;

an upper electrode formed on the organic EL layer;

a sealing member for sealing said lower electrode, organic EL layer and upper electrode on said substrate so that they are covered with the sealing member, wherein said sealing member is made of an aluminum material coated with an insulating layer in its inner surface.

2. An organic EL device according to claim 1, wherein said aluminum material is a flexible aluminum sheet.

3. An organic EL device according to claim 1, wherein said insulating layer is an aluminum oxide layer formed by anodic oxidation of said aluminum material.

4. An organic EL device according to claim 1, wherein said insulating layer is a porous aluminum oxide layer.

5. An organic EL device according to claim 3, wherein said aluminum sheet is formed in such a manner that a surface of said aluminum oxide layer is subjected to gas flow-out treatment in

vacuum, and thereafter said lower electrode, organic EL layer and upper electrode are sealed on the substrate in an atmosphere of inert gas.

6. A method of manufacturing an organic EL device comprising the steps of:

forming a lower electrode formed on a substrate;

forming an organic EL layer on the lower electrode;

forming an upper electrode on the organic EL layer to provide the organic EL device;

preparing an aluminum material coated with an insulating layer in at least its inner surface; and

sealing said organic EL device so that it is covered with said aluminum material.

7. A method of manufacturing an organic EL device according to claim 6, wherein

said step of preparing the aluminum material comprises the steps of:

making anodic oxidation to form an aluminum oxide layer on a surface of a flexible aluminum sheet; and

removing gas contained within said aluminum oxide layer, and

said step of sealing said organic EL device comprises the step of:

fixing said aluminum sheet with the gas removed on a surface of said substrate in an atmosphere of inert gas or in vacuum.

8. A method of manufacturing an organic EL device according to claim 1, wherein said step of removing gas is to heat the aluminum sheet with the aluminum oxide layer for several-60 minutes at 60-300 °C in vacuum.

9. A method of manufacturing an organic EL device according to claim 7, wherein said step of making anodic oxidation is to form a porous aluminum oxide layer; and

said step of removing gas is to heat said aluminum sheet in vacuum so that impurities contained in pores of said porous aluminum oxide layer are discharged.

10. A method of manufacturing an organic EL device according to claim 7, wherein

said step of sealing said organic EL device comprises the steps of:

mounting said organic EL device and aluminum sheet in a sealing chamber and once heating them at room temperature- 150 °C in vacuum;

introducing inert gas into the sealing chamber; and

fixing said aluminum sheet to said substrate through an

adhesive and heating it.

11. A method of manufacturing an organic EL device according to claim 7, wherein said inert gas is argon gas.

ABSTRACT

An organic EL device includes a lower electrode formed on a substrate; an organic EL layer formed on the lower electrode; an upper electrode formed on the organic EL layer; a sealing member for sealing the lower electrode, organic EL layer and upper electrode on the substrate. The sealing member is made of an aluminum material coated with an insulating layer in its inner surface. Since the inner surface of the sealing member is coated with the insulating layer, contact of the sealing member with the upper electrode produces no trouble. Since the surface of the insulating layer 4 is porous, by removing the gas from the surface of the insulating layer 4, impurities in the internal space 5 can be taken into a large number of pores of the insulating layer 4. In such a configuration, a thin-profile and reliable organic EL device can be provided which can be manufactured with improved efficiency of manufacture and at reduced production cost.

Fig. 1

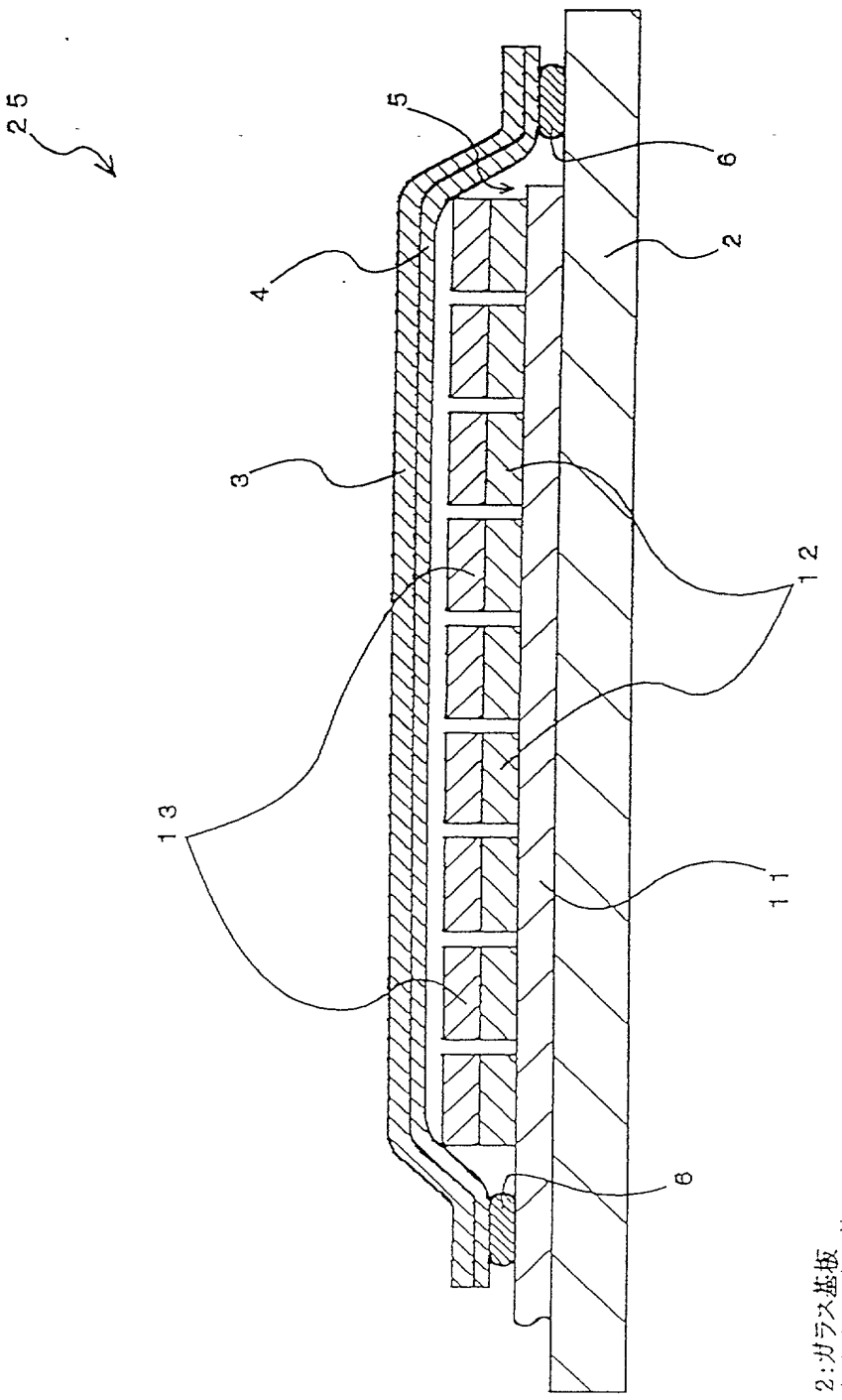

25
5
6
4
2
3
12
13
11
8
2:ガラス基板
3:アルミニウム箔
4:アルマイト層
11:ITO透明電極
12:有機層
13:上部電極

Fig.2

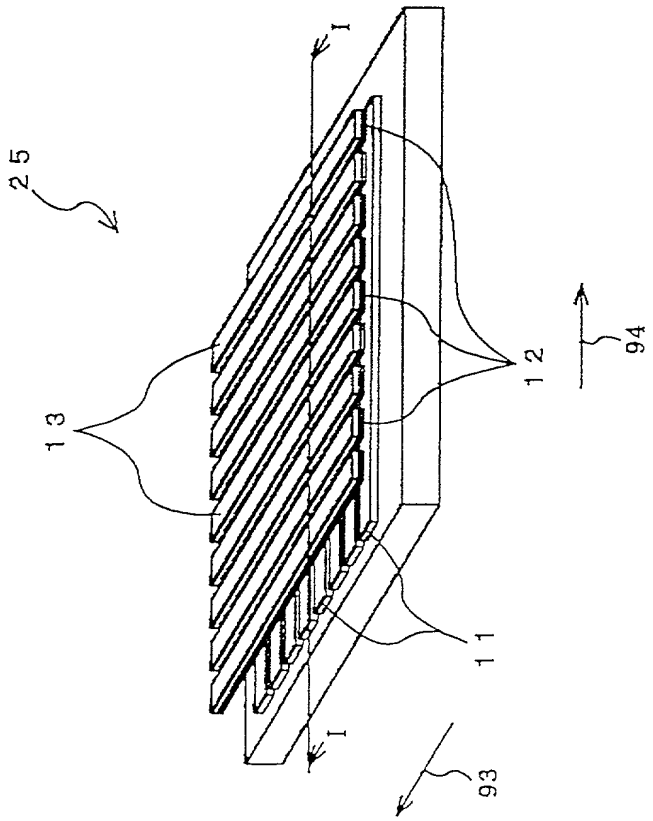
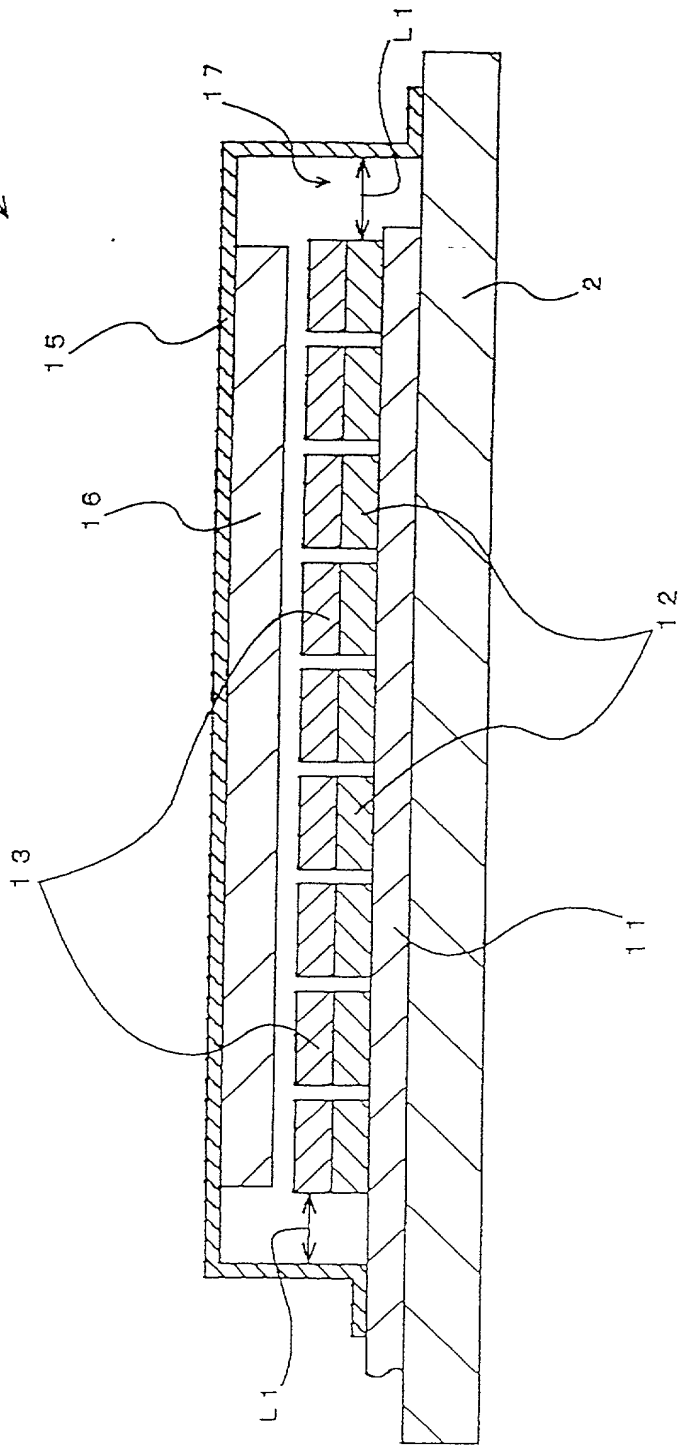


Fig. 3

PRIOR ART

<従来技術>



COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

ATTORNEY DOCKET NO.:

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ORGANIC EL DEVICE AND METHOD OF MANUFACTURING THE SAME

the specification of which:

is attached hereto; or

was filed as United States application Serial No. _____ on _____ and was amended on _____(if applicable); or

was filed as PCT international application Number _____ on _____ and was amended under PCT Article 19 on_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office information which is material to the patentability of claims presented in this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate or §365(a) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN APPLICATION(S):

COUNTRY (if PCT, indicate PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED
Japan	Pat.Hei.10-337976	27/November/1998	[X] Yes [ ] No
			[ ] Yes [ ] No
			[ ] Yes [ ] No
			[ ] Yes [ ] No

Combined Declaration For Patent Application and Power of Attorney - **(Continued)**
(includes Reference to PCT International Applications)

ATTORNEY DOCKET NO.:

I hereby claim the benefits under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

U.S. PROVISIONAL APPLICATIONS

U.S. PROVISIONAL APPLICATION NO.	U.S. FILING DATE

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or §365(c) of any PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to the patentability of claims presented in this application in accordance with Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT:

U.S. APPLICATIONS		STATUS (Check One)		
U.S. APPLICATION NO.	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

POWER OF ATTORNEY: As a named inventor, I hereby appoint the registered practitioners of Morgan, Lewis & Bockius LLP included in the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to that Customer Number.

Customer Number: 009629

Direct Telephone Calls To:
(name and telephone number)

J. Michael Thesz
202-467-7658

Combined Declaration For Patent Application and Power of Attorney - **(Continued)**
(includes Reference to PCT International Applications)

ATTORNEY DOCKET NO.:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF SOLE OR FIRST INVENTOR	Haruo TANAKA	
RESIDENCE & CITIZENSHIP	Kyoto, Japan	COUNTRY OF CITIZENSHIP Japan
POST OFFICE ADDRESS	c/o ROHM CO., LTD., 21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto-shi, Kyoto, Japan	
FIRST OR SOLE INVENTOR'S SIGNATURE	Haruo Tanaka	DATE November 19, 1999

FULL NAME OF SECOND INVENTOR		
RESIDENCE & CITIZENSHIP		COUNTRY OF CITIZENSHIP
POST OFFICE ADDRESS		
SECOND INVENTOR'S SIGNATURE		DATE

FULL NAME OF THIRD INVENTOR		
RESIDENCE & CITIZENSHIP		COUNTRY OF CITIZENSHIP
POST OFFICE ADDRESS		
THIRD INVENTOR'S SIGNATURE		DATE

Listing of Inventors Continued on attached page(s) [ ] Yes [X] No